WE CLAIM:

1. A method of generating ultraviolet light, comprising the steps of:

tuning a neodymium-doped yttrium aluminum garnet crystal laser to output a first fundamental beam at approximately 946 nanometers;

doubling the frequency of the first fundamental beam to produce a second harmonic beam having a wavelength of approximately 473 nanometers; and

producing a fourth harmonic beam having a wavelength of approximately 236.5 nanometers by doubling the frequency of the second harmonic beam using a first cesium lithium borate crystal oriented for non-critical phase-matching.

2. The method of claim 1, further comprising the step of cooling the first cesium lithium borate crystal to between -10 degrees centigrade and -20 degrees centigrade.

3. The method of claim 1, further comprising the step of disposing the first cesium lithium borate crystal in a container of dry inert gas.

4. The method of claim 1, further comprising the step of disposing the first cesium lithium borate crystal in a vacuum.

5. The method of claim 1, further comprising the step of confocal focusing of the second harmonic beam into the first cesium lithium borate crystal.

6. The method of claim 1, further comprising the steps of:

tuning a rare earth doped garnet laser to emit a second fundamental beam at a wavelength of approximately 1077 nanometers;

directing the second fundamental beam and the fourth harmonic beam to a second cesium lithium borate crystal; and

sum-frequency mixing the second fundamental beam and the fourth harmonic beam in the second cesium lithium borate crystal to produce an output beam at approximately 194 nanometers.

7. The method of claim 3, wherein the dry inert gas is selected from the group consisting of nitrogen, dry air, helium, neon, argon, krypton and xenon.

8. An apparatus for generating ultraviolet light, comprising:

means for tuning a neodymium-doped yttrium aluminum garnet crystal to output a first fundamental beam at approximately 946 nanometers;

means for doubling the frequency of the fundamental beam to produce a second harmonic beam having a wavelength of approximately 473 nanometers; and

means for producing a fourth harmonic beam having a wavelength of approximately 236.5 nanometers by doubling the frequency of the second harmonic beam using a first cesium lithium borate crystal oriented for non-critical phase-matching.

9. The apparatus of claim 8, further comprising means for cooling the first cesium lithium borate crystal to between -10 degrees centigrade and -20 degrees centigrade.

10. The apparatus of claim 8, further comprising means for disposing the first cesium lithium borate crystal in dry inert gas.

11. The apparatus of claim 8, further comprising means for disposing the first cesium lithium borate crystal in a vacuum.

12. The apparatus of claim 8, further comprising means for confocal focusing of the second harmonic beam into the first cesium lithium borate crystal.

13. The apparatus of claim 8, further comprising:

means for emitting a second fundamental beam at a wavelength of approximately 1077 nanometers;

means for directing the second fundamental beam and the fourth harmonic beam to a second cesium lithium borate crystal; and

means for tuning the second cesium lithium borate crystal to sum-frequency mix the second fundamental beam and the fourth harmonic beam to produce an output beam at approximately 194 nanometers.

14. The apparatus of claim 10, wherein the dry inert gas is selected from the group consisting of nitrogen, dry air, helium, neon, argon, krypton and xenon.

15. An apparatus for generating ultraviolet light, comprising:

an active laser medium comprising a garnet crystal doped with a rare earth element;

a diode pump laser for pumping the active laser medium;

a resonator for generating a fundamental beam having a wavelength of approximately 946 nanometers from the pumped active laser medium;

a periodically-poled potassium titanyl phosphate crystal for producing a second harmonic beam having a wavelength of approximately 473 nanometers; and

a cesium lithium borate crystal cooled to a temperature in the range from -10° centigrade to -20° centigrade and oriented for non-critical phase-matching, for producing a fourth harmonic beam having a wavelength of approximately 237 nanometers.

16. The apparatus of claim 15, wherein the active laser medium comprises a neodymium-doped yttrium aluminum garnet crystal.

17. The apparatus of claim 16, wherein the neodymium-doped yttrium aluminum garnet crystal comprises a first un-doped end portion, a doped central portion and a second un-doped end portion.

18. An apparatus for generating ultraviolet light, comprising:

an Nd:$LiYF_4$ laser tuned to output a fifth harmonic beam at approximately 209 nanometers;

a garnet laser doped with a rare earth element and tuned to output a fundamental beam at approximately 1305 nanometers; and

a cesium lithium borate crystal for sum-frequency mixing the fundamental beam and the fifth harmonic beam to produce an output beam at approximately 180 nanometers.